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Ephemeris for Physical Observations of Mars, 1883–84.

By A. Marth.

Greenw. Noon. 1883.	P.	Areographical Longit. of Disk's Centre.	Areographical Latit. of Disk's Centre.	Diameter.	*q*	Q	E	Log. Light-ratio.
	°	°	°	″	″	°	°	
Oct. 20	352·47	191·53	+14·75	7·10	0·81	283·53	39·37	9·1286
22	353·08	172·38	15·06	7·18	·81	283·86	39·36	·1375
24	353·68	153·24	15·35	7·27	·82	284·17	39·33	·1467
26	354·27	134·12	15·63	7·36	·83	284·47	39·29	·1561
28	354·86	115·01	15·90	7·45	·84	284·75	39·23	·1657
30	355·44	95·91	16·16	7·55	·85	285·02	39·16	·1756
Nov. 1	356·00	76·83	+16·40	7·65	0·85	285·29	39·07	9·1858
3	356·55	57·77	16·64	7·75	·86	285·54	38·96	·1962
5	357·09	38·73	16·86	7·85	·87	285·77	38·84	·2069
7	357·62	19·71	17·07	7·96	·87	285·99	38·70	·2178
9	358·14	0·70	17·27	8·07	·88	286·20	38·54	·2290
11	358·64	341·71	17·46	8·18	·88	286·39	38·36	·2405
13	359·13	322·75	17·64	8·30	·89	286·57	38·17	·2522
15	359·60	303·81	17·80	8·42	·89	286·73	37·95	·2642
17	0·06	284·89	17·96	8·55	·89	286·88	37·70	·2765
19	0·50	266·00	18·10	8·68	·89	287·02	37·43	·2890
21	0·93	247·13	18·23	8·81	·89	287·14	37·14	·3018
23	1·34	228·29	18·34	8·95	·89	287·25	36·82	·3149
25	1·72	209·48	18·45	9·09	·89	287·34	36·48	·3282
27	2·08	190·70	18·54	9·24	·89	287·41	36·10	·3417
29	2·43	171·96	18·62	9·39	·88	287·46	35·69	·3555
Dec. 1	2·76	153·25	+18·68	9·54	0·87	287·50	35·25	9·3695
3	3·06	134·58	18·74	9·70	·87	287·52	34·78	·3838
5	3·34	115·94	18·78	9·86	·86	287·51	34·27	·3982
7	3·59	97·34	18·81	10·02	·84	287·49	33·72	·4128
9	3·82	78·78	18·82	10·19	·83	287·45	33·14	·4275
11	4·03	60·27	18·83	10·36	·81	287·38	32·52	·4424
13	4·21	41·80	18·82	10·53	·79	287·29	31·86	·4574
15	4·35	23·37	18·79	10·71	·77	287·18	31·15	·4725
17	4·47	4·99	18·76	10·89	·75	287·03	30·40	·4877
19	4·56	346·66	18·71	11·08	·72	286·86	29·60	·5029
21	4·62	328·37	18·65	11·26	·69	286·65	28·76	·5180
23	4·65	310·14	18·57	11·45	·66	286·41	27·87	·5331
25	4·65	291·96	18·48	11·63	·63	286·13	26·93	·5480

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Greenw. Noon. 1883.		P	Areographical Longit. of Disk's Centre.	Latit.	Diameter.	*q*	Q	E	Log. Light-ratio.
Dec.	27	4·61	273·84	18·38	11·82	·60	285·80	25·94	·5628
	29	4·54	255·77	18·27	12·01	·56	285·43	24·90	·5773
	31	4·43	237·75	18·14	12·19	·52	285·00	23·80	·5915
1884. Jan.	2	4·29	219·79	+18·00	12·38	0·48	284·51	22·65	9·6054
	4	4·12	201·89	17·84	12·55	·44	283·95	21·46	·6188
	6	3·91	184·03	17·67	12·73	·39	283·30	20·21	·6317
	8	3·67	166·23	17·50	12·89	·35	282·55	18·91	·6439
	10	3·40	148·48	17·31	13·05	·31	281·68	17·57	·6554
	12	3·09	130·78	17·10	13·20	·26	280·65	16·18	·6662
	14	2·75	113·12	16·89	13·34	·22	279·42	14·75	·6762
	16	2·39	95·51	16·67	13·47	·18	277·95	13·28	·6852
	18	2·00	77·94	16·44	13·59	·14	276·11	11·78	·6932
	20	1·59	60·40	16·20	13·69	·11	273·76	10·26	·7001
	22	1·15	42·89	15·95	13·77	·08	270·63	8·73	·7058
	24	0·69	25·41	15·70	13·84	·05	266·23	7·19	·7104
	26	0·21	7·95	15·44	13·89	·03	259·6	5·70	·7137
	28	359·73	350·51	15·19	13·93	·02	248·6	4·30	·7156
	30	359·23	333·07	14·93	13·94	·01	228·8	3·18	·7163
Feb.	1	358·73	315·64	+14·68	13·94	0·01	196·5	2·71	9·7155
	3	358·23	298·20	14·43	13·91	·01	164·3	3·19	·7134
	5	357·74	280·76	14·19	13·87	·02	144·8	4·31	·7100
	7	357·25	263·30	13·95	13·81	·03	133·9	5·70	·7053
	9	356·77	245·82	13·73	13·73	·05	127·28	7·17	·6993
	11	356·31	228·31	13·51	13·64	·08	122·88	8·68	·6921
	13	355·86	210·78	13·31	13·53	·11	119·72	10·19	·6837
	15	355·44	193·21	13·13	13·40	·14	117·33	11·68	·6742
	17	355·04	175·59	12·96	13·26	·17	115·45	13·15	·6637
	19	354·67	157·94	12·81	13·12	·21	113·92	14·58	·6522
	21	354·32	140·25	12·67	12·96	·25	112·65	15·97	·6399
	23	354·00	122·51	12·55	12·79	·29	111·57	17·32	·6268
	25	353·71	104·72	12·46	12·61	·33	110·64	18·62	·6129
	27	353·45	86·88	12·38	12·43	·37	109·84	19·87	·5984
	29	353·23	68·99	12·32	12·24	·41	109·14	21·07	·5834
Mar.	2	353·04	51·05	+12·28	12·05	0·45	108·53	22·22	9·5679
	4	352·88	33·06	12·27	11·86	·48	108·00	23·32	·5521
	6	352·76	15·01	12·27	11·67	·52	107·54	24·37	·5359
	8	352·67	356·92	12·29	11·47	·55	107·13	25·36	·5195

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Greenw. Noon. 1884.	P	Areographical Longit.	Latit. of Disk's Centre.	Diameter.	*q*	Q	E	Log. Light-ratio.
Mar. 10	352·61	338·77	12·33	11·28	·58	106·77	26·30	·5029
12	352·58	320·58	12·39	11·09	·61	106·47	27·20	·4861
14	352·58	302·34	12·47	10·89	·64	106·21	28·04	·4693
16	352·61	284·05	12·56	10·70	·66	105·99	28·84	·4524
18	352·67	265·72	12·67	10·52	·69	105·80	29·59	·4355
20	352·75	247·35	12·79	10·33	·71	105·65	30·30	·4187
22	352·87	228·93	12·93	10·15	·72	105·53	30·97	·4220
24	353·01	210·47	13·08	9·97	·74	105·44	31·59	·3853
26	353·17	191·97	13·25	9·80	·75	105·38	32·17	·3688
28	353·36	173·43	13·43	9·63	·76	105·34	32·72	·3524
30	353·57	154·86	13·62	9·46	·77	105·32	33·23	·3362
Apr. 1	353·81	136·25	+ 13·82	9·30	0·78	105·33	33·70	9·3202
3	354·07	117·60	14·03	9·14	·79	105·36	34·14	·3044
5	354·35	98·92	14·25	8·99	·79	105·40	34·54	·2888
7	354·65	80·21	14·48	8·84	·80	105·46	34·92	·2735
9	354·96	61·46	14·72	8·69	·80	105·54	35·26	·2584
11	355·30	42·68	14·97	8·55	·80	105·63	35·57	·2436
13	355·65	23·88	15·22	8·41	·80	105·73	35·86	·2291
15	356·02	5·05	15·48	8·28	·79	105·85	36·12	·2148
17	356·41	346·19	15·74	8·15	·79	105·97	36·36	·2007
19	356·81	327·31	16·01	8·02	·79	106·11	36·57	·1869
21	357·23	308·40	16·29	7·90	·78	106·25	36·76	·1734
23	357·66	289·46	16·56	7·78	·78	106·41	36·93	·1601
25	358·11	270·50	16·84	7·67	·78	106·57	37·08	·1471
27	358·57	251·52	17·12	7·56	·77	106·74	37·21	·1344
29	359·04	232·52	17·41	7·45	·76	106·91	37·32	·1220
May 1	359·52	213·50	+ 17·70	7·34	0·76	107·09	37·41	9·1098
3	0·02	194·45	17·99	7·24	·75	107·27	37·48	·0979
5	0·53	175·38	18·27	7·14	·74	107·45	37·54	·0862
7	1·04	156·29	18·56	7·05	·73	107·64	37·58	·0748
9	1·57	137·18	18·85	6·95	·72	107·83	37·61	·0637
11	2·11	118·06	19·14	6·86	·71	108·03	37·62	·0528
13	2·66	98·92	19·42	6·77	·70	108·22	37·62	·0422
15	3·21	79·76	+ 19·71	6·69	0·70	108·42	37·61	9·0318

1883, Oct. 26 ... Spring Equinox of *Mars*' Northern Hemisphere.

1884, May 13 ... Summer Solstice ,, ,,

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P denotes the angle of position of the planet's axis, *q* the amount and *Q* the position-angle of the greatest defect of illumination, E the areocentric angle between Earth and Sun. The last column gives the logarithm of the ratio of the apparent brightness of *Mars* to that at mean opposition, computed upon the supposition that the diminution of brightness due to the phase depends simply on the proportion of the unilluminated portion to the whole of the disk.

The data of the ephemeris are to be interpolated directly for the times for which they are required, the equation of light having already been taken into account. The difference of successive values of the longitude of the centre of the disk amounts to one rotation and some 340 degrees, so that, for instance, the difference Oct. 20 to 22 is 700°·85, and that from Jan. 29 to Feb. 1 702°·57.

The assumed daily rate of rotation is 350°·8922. This value, which I have used in my computations since 1864, depended originally on Kaiser's determination of the period of the planet's sidereal rotation 24^{h} 37^{m} 22^{s}·62, mentioned in his paper, published in April 1864, in No. 1468 of the *Astron. Nachr.* Its approximate correctness, however, has been tested and corroborated quite independently by means of what appear to me by far the best old observations available for the purpose, those made by Maraldi in 1704, and published in the *Mémoires* of the Paris Academy, of 1706. However imperfect representations the sketches there given may be, there seems to be no valid doubt or difficulty in their correct interpretation and in recognising in the spot, the arrival of which at the middle of the disk Maraldi observed on four successive nights, Mädler's *r* or Schiaparelli's Sinus Titanum. In October 1704 the spot passed the middle line a little to the north of the centre. If observers could have been induced to make corresponding observations in 1877, the circumstances would have been similar and the determination of rotation nearly independent of them; but the opportunity seems to have been missed, and will not come again till 1894, though their best chance observers will not get till 1909. A comparison of the results of Maraldi's observations with those of the corresponding observations of Schiaparelli, made in November 1879, when the spot passed the middle line on the south side of the centre, shows that the adopted rate of rotation is nearly correct, since the means of the deduced areographical longitudes agree within 2°, while an alteration of 0°·0001 in the daily rate makes, in the interval from October 1704 to November 1879 a difference of 6° 3948. The daily rate 350°·89217 of the tropical rotation would give 24^{h} 37^{m} 22^{s}·626 as the period of the sidereal rotation. For the present I have made no alteration in the adopted rate, nor shifted the zero meridian. The position of the equator of *Mars* is that adopted in the ephemerides for the last two oppositions (v. *Monthly Notices*, vol. xxxix. p. 473). I have

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not yet learnt whether the last opposition has yielded any contributions towards a better determination. Perhaps the approaching one may be more fruitful.

Errata.

Page 350, sixth line from bottom. *For* $P_0^{(i)}$ *read* $P_0^{(1)}$.

„ 356, fourth line from top. *For* half *read* twice.

„ 358, coefficient of e^{10} sin 8M. *For* $-\frac{1182827}{2^7.3^4.5.7}$, *read* $-\frac{4745483}{2^9.3^4.5.7}$,

and in the coefficient of e^{12} sin 10M. *For* $-\frac{769805651}{2^{12}.3^4.5.7.11}$, *read* $-\frac{76972457}{2^{11}.3^4.7.11}$.